

TWRA FISHERIES REPORT 01-42

Elk River Creel Survey Results

April – October 2000

Prepared By

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INTRODUCTION

Fishing pressure and angler demographics at the Elk River below Tims Ford Dam were previously examined in the late 1980's and in 1995 (Bettoli 1989; Bettoli and Besler 1996). A decline in fishing pressure between 1987 and 1995 was detected, but fishing success (fish caught per hour) increased in 1995. This report presents the findings of a roving creel survey conducted during the 2000 fishing season. In 2000, the Elk River received monthly stockings of catchable (23 – 30 cm total length) rainbow trout between April and November (total = 31,000 fish) and a single stocking of 8,100 catchable brown trout in March. Fingerling rainbow trout were also stocked on 21 June 2000 (n = 15,000) and 5 September 2000 (n = 30,000).

METHODS

A stratified uniform-probability roving creel survey was conducted between April and October 2000. The survey was designed to collect information on the amount of fishing pressure the tailwater received, the catch and harvest rates of rainbow trout and brown trout, and the catch per unit of effort for both species.

The survey was stratified into seven one-month periods (April – October 2000). Approximately seven weekdays and eight weekends and holidays were surveyed each month. Sampling days were divided into equal work periods based on sunrise and sunset times. The AM and PM work periods were sampled with equal probability. The clerk counted anglers once each work shift by visiting all of the known access sites on the river

(Figure 1). The time to start the count was randomly selected from a list of possible start times for each shift, beginning at daylight (or midday) and every 30 minutes thereafter until 1 h before the end of the shift. When more boat trailers were observed than boats on the river, the counts were adjusted upwards by adding two anglers for each boat that was presumed to be on the river, but was not observed.

Before and after the count, the clerk interviewed anglers. They were asked how long they had been fishing that day, whether they were finished fishing, and how many trout they had caught. All creel trout were measured to the nearest cm. Anglers were asked their state of residency and Tennessee residents were also asked for their county residence. The clerk also recorded the method of fishing used by each angler.

Mean daily counts were expanded to estimate effort in each stratum (i.e., kind-of-day), then pooled to estimate effort each month following the methods of Pollock et al. (1994). Catch and harvest rates were measured using the mean of ratios method, which is recommended for roving creel surveys (Pollock et al. 1997); interviews of parties that had been fishing for less than 30 minutes were excluded from the analysis. Catch and harvest of each trout species were then estimated for each two-week period. Standard errors of catch, harvest, and effort each two-week period were calculated according to Pollock et al. (1994). A spreadsheet performed all necessary calculations. The pooled variance for total pressure, total harvest, and total catch of each species was calculated using the mean-square-successive-difference-between-periods procedure. The standard error of each estimate was calculated by taking the square root of the variance.

Discharge data were obtained from the Tennessee Valley Authority. When the clerk made his count each day, he recorded the water temperature at the dam access site and at the Old Dam Ford access site.

RESULTS and DISCUSSION

Fishing pressure was very light during the April-October 2000 survey period. Total fishing pressure was estimated to be 7,858 hours (Table 1), which was lower than the 14,340 hours estimated during a shorter survey (April-September) on the same reach of river in 1995 (Bettoli and Besler 1996). Over the same 26-week survey periods, fishing pressure dropped about 47% between the 1995 survey and the 2000 survey. On a weekly basis, fishing pressure on the Elk River during the 2000 survey averaged only 261 hours per week, the lowest fishing pressure of any tailwater surveyed in Tennessee since 1995. In contrast, fishing pressure on other Tennessee tailwaters fisheries (e.g., Caney Fork, Clinch, South Fork of the Holston, Obey) exceeds 1,200 hours per week and on the most popular tailwaters, pressure can exceed 2,000 and even 3,000 hours per week (Devlin and Bettoli 1999). Fishing pressure at Old Dam Ford was light throughout the survey. Only twenty-nine anglers were observed at that access point during counts and only 3% of all interviews were from anglers at Old Dam Ford. Also, no anglers were observed at that access after July 2000.

On a per hectare basis, the fishing pressure on the Elk River fell from 12 h/week/hectare in 1987 to 10 h/week/ha in 1995 and 5 h/week/hectare in 2000. Compare these per-area pressure estimates to others in Tennessee:

River	Year	Pressure (h) per hectare per week	Reference
Elk	2000	5	This study
Hiwassee	1987	5	Bettoli (1989)
Hiwassee	2000	7	Luisi and Bettoli (2001)
Elk	1995	10	Bettoli and Besler (1996)
Elk	1987	12	Bettoli (1989)
Clinch	1996	12	Bettoli and Bohm (1997)
Watauga	1998	15	Bettoli (1999)
Caney Fork	1995	17	Bettoli and Xenakis (1996)
Caney Fork	1997	21	Devlin and Bettoli (1999)
S.F. Holston	1997	36	Bettoli et al. (1999)

On most Tennessee tailwaters, including the Elk River, fishing pressure is inversely related to the dam discharges. Average daily discharge between April and September was more than 3X higher in 2000 (640 cfs) than in 1995 (189 cfs), which might explain lower fishing pressure in 2000. The greatest disparity in discharges occurred in April; minimum flows occurred every day in April 1995, but were exceeded in 18 of 30 days in April 2000. Fishing pressure in April each year reflected those different discharge regimes (1,960 hours in April 1995; 942 hours in April 2000). However, the greatest disparity in fishing pressure between the two years occurred in the summer months, when discharges were low *both* years, yet monthly fishing pressure was 3X-4X higher in 1995. Thus, water discharge patterns cannot account for most of the drop in fishing pressure between 1995 and 2000.

The clerk interviewed 364 anglers in 231 parties. Mean trip length averaged 2.82 hours; thus, an estimated 2,786 trips were made to the tailwater during the survey period, a drop of about 40% from 1995 when 4,610 trips were made in only six months.

As in 1995, the catch rate (number of trout of both species caught per hour) on the Elk River was very high and averaged 2.6 trout per hour over the entire survey period. Anglers reported catching over 13,000 rainbow trout and 5,247 brown trout during the survey period. However, only 2,565 rainbow trout and 700 brown trout were harvested (Table 1).

No rainbow trout longer than 36 cm (14 inches) were observed in the creel (Figure 2). The size distribution for creeled rainbow trout was influenced by the different sizes of trout stocked by Dale Hollow National Fish Hatchery (23 – 25 cm) and Flintville State Fish Hatchery (25-30 cm). The average size of creeled rainbow trout increased from 25.1 – 26.4 cm in April-June to 29.1-30.1 cm in July-October. No tagged fish were stocked, so it is unknown whether stocked rainbow trout grew between April and October 2000 or how many (if any) of the harvested trout were holdovers from 1999. In 1995, stocked rainbow trout grew 10-13 mm/month, although few survived longer than 100 days post-stocking (Bettoli and Besler 1996). Some brown trout longer than 25 cm were creeled during the 2000 survey, and those fish were holdovers from earlier stockings.

The return rate for the 31,000 rainbow trout stocked during the survey was a scant 8%, which reflected the low pressure the river received. If substantial numbers of holdover rainbow trout (i.e., those stocked in previous years) were harvested, then the return rate for rainbow trout stocked in 2000 would be even less. In 1995 the pooled return rate was twice as high (15%) because pressure was more than twice as high; however, even a return rate of 15% is poor in the absence of substantial overwintering by stocked fish. The number of brown trout harvested during the 2000 survey represented 10% of the 7,000 brown trout stocked in March 2000; however, the length-frequency distribution indicates that as many as half of all harvested brown trout originated from stockings that took place before 2000.

Compared to other Tennessee tailwaters, the Elk River in 1995 boasted the highest percentage (25%) of anglers who were flyfishing and using artificial lures or flies. In the 2000 survey, that percentage increased to an astounding 65%; anglers that were spinfishing and stillfishing dropped to only 28% and 7%, respectively, of all anglers interviewed. The Elk River in 2000 was the only Tennessee tailwater trout fishery surveyed since 1995 where anglers using artificial lures or flies outnumbered anglers using bait by more than a two-to-one ratio. Most of the anglers interviewed were from Tennessee (87%), followed by Alabama (12%); Alabama residents in 1995 represented 18% of the anglers interviewed. Equal numbers of Tennessee anglers lived in the three counties adjoining the tailwater (Moore – 20%; Franklin – 19%; Lincoln – 11%) as in all other counties (15 others – 50%). In 1995 a similar high percentage (62%) of anglers fishing the Elk River were non-local anglers.

Water temperatures measured each survey day by the clerk at the dam access site and Old Dam Ford never exceeded 17 °C during April, May, and June. However, water temperatures climbed to 20 - 23 °C in July and did not drop below 20 °C until October. That temperature range (20-23 °C) is not acutely lethal to brown trout or rainbow trout, but it is well above the range considered appropriate for good trout growth and survival (Cherry et al. 1977; Biagi and Brown 1997).

CONCLUSIONS

Poor rates of return (8-10%) for trout stocked into the Elk River in 2000 reflected very low pressure that the fishery received. Bettoli and Besler (1996) recommended that

efforts should be undertaken to improve access, particularly ramp access, and increase fishing pressure. Such efforts, if any, have failed to popularize the fishery. Although the stocking rate has been reduced from 1995 levels, the amount of pressure the river receives does not justify the number of trout ($n = 44,000$) that are stocked annually.

Annual monitoring by TWRA has revealed that some rainbow trout and brown trout overwinter each year (Cleveland et al. 1999, 2000), particularly brown trout. The sizes of rainbow trout collected in spring samples reflected the sizes of fish stocked in October and November the previous year, but brown trout longer than 400 mm total length were observed, indicating that some brown trout were carrying-over for several years.

Temperature data along the length of the river are being logged automatically during the summer and fall of 2001 to describe the thermal regime present in the tailwater. Immediate steps that could be taken to efficiently manage the fishery include a further reduction in the number of trout (both species) that are stocked by TWRA, with the objectives of (1) promoting better growth and survival of trout that are not harvested; and (2) increasing return rates. Stocking trout in late summer–early fall (August–October) should be sharply curtailed in light of the fact that fishing pressure was extremely low and water temperatures were elevated. As noted by Bettoli and Besler (1996), improved access might also encourage higher visitation rates and better return rates. Finally, consideration should be given to eliminating trout stockings at Old Dam Ford in the summer and fall because of warm temperatures and low visitation..

ACKNOWLEDGMENTS

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Table 1. Fishing pressure and harvest rates on the Elk River, 2000. Standard errors in parentheses.

Month	Pressure (h)	Number of Rainbow Trout		Number of Brown Trout		Catch Rate ¹
		Caught	Harvested	Caught	Harvested	
April	942 (219)	681 (203)	65 (26)	649 (218)	24 (17)	1.42
May	3,314 (496)	3,695 (1,088)	849 (427)	776 (268)	0	1.32
June	1,690 (346)	5,256 (1,361)	877 (238)	2,565 (910)	596 (275)	5.05
July	869 (168)	2,381 (695)	574 (234)	853 (494)	26 (26)	3.72
August	442 (140)	635 (271)	126 (97)	82 (45)	0	2.43
September	419 (114)	440 (182)	74 (38)	248 (183)	0	2.12
October	182 (59)	86 (56)	0	74 (53)	54 (54)	1.43
Total	7,858 hours (2,314)	13,174 (3,663)	2,565 (1,992)	5,247 (731)	700 (632)	2.64

¹ – Number of trout [both species] caught per hour

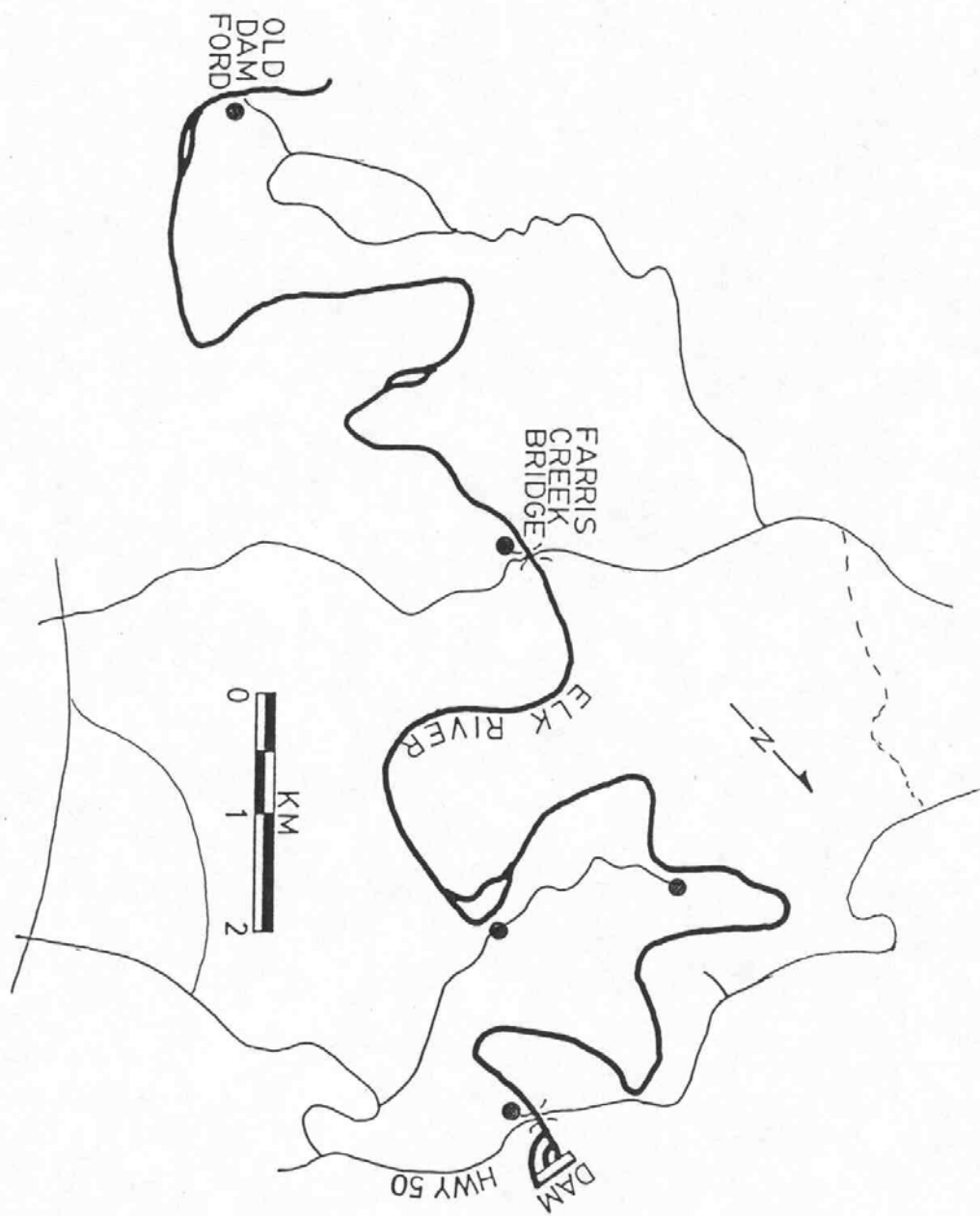


Figure 1 . Map of the Elk River below Tims Ford Dam. Access points are indicated with a filled circle.

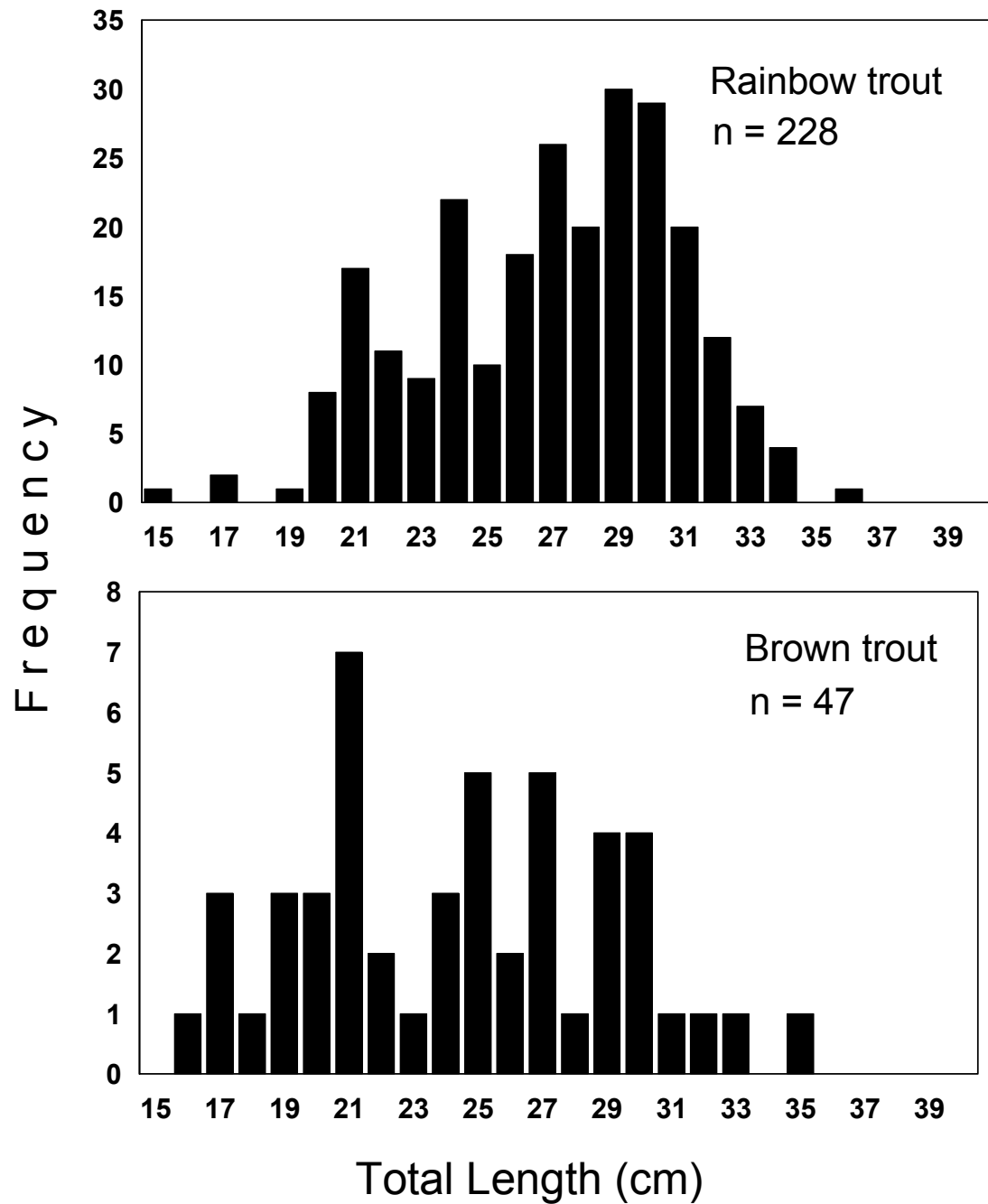


Figure 2. Length-frequency distribution for rainbow trout and brown trout creelied by anglers on the Elk River, 2000.

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August 7, 2001

Mr. Frank Fiss, Trout Program Coordinator
Tennessee Wildlife Resources Agency
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Dear Mr. Fiss:

I have enclosed a final draft of the Elk River report. It incorporates suggestions and comments you made on the first draft.

As always, thank-you for your support of our tailwater trout research program.

Sincerely,

Phillip W. Bettoli
Professor of Biology and Assistant Unit Leader

enclosure